



UWL REPOSITORY

repository.uwl.ac.uk

Implementation of project-based learning in structural design and architectural modules to achieve improved graduate employability

Rizzuto, Joseph and Balodimou, Efcharis ORCID: <https://orcid.org/0000-0003-1249-3941> (2022)
Implementation of project-based learning in structural design and architectural modules to achieve improved graduate employability. In: Expert Academy Festival of Learning and Teaching, 19 Jul 2022, Ealing, London. (Unpublished)

This is the Submitted Version of the final output.

UWL repository link: <https://repository.uwl.ac.uk/id/eprint/9326/>

Alternative formats: If you require this document in an alternative format, please contact: open.research@uwl.ac.uk

Copyright:

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy: If you believe that this document breaches copyright, please contact us at open.research@uwl.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.

Implementation of Project-Based Learning in structural design and architectural modules to achieve improved graduate employability

Prof. Joseph Rizzuto

Dr Efcharis Balodimou

School of Computing and Engineering

19th July 2022

Summary

- Introduction
 1. Liaising with professional bodies
 2. Applying Project based learning and Group work
 3. Using industry practices
 4. Site visits
 5. Liaising with industry practitioners
- Conclusions
- References

Introduction

- Many UK civil engineering and architectural programmes address industry's requirements for graduates that can:
 - identify and solve **complex** problems
 - understand **ethical, environmental** and the **business** aspects of Built Environment projects.
- Project-based learning (PBL) is a successful learning strategy for the development of graduate employability skills that has a considerable impact on **work-readiness**.
- PBL group projects lead to **enhanced** employability skills and provide ample scope for the development of **original** and **innovative** design solutions

1 Liaising with professional bodies to inform the curriculum relevant to practice

- Accreditation process
- Consultation when any changes in Courses are planned
- Participating in CPD events and competitions
- Organising end of year shows / events to show-case student work and give awards



JBMM – Joint Board of Moderators for Civil Engineering Course

2 Project Based Learning

- Project-based learning (PBL) is a successful learning strategy for the development of graduate employability skills that has a considerable impact on work-readiness.
- PBL group projects lead to **enhanced** employability skills and provide ample scope for the development of **original** and **innovative** design solutions
- PBL practiced in Engineering and Built environment courses simulate **real life** projects in assignment briefs and encourage **group work**

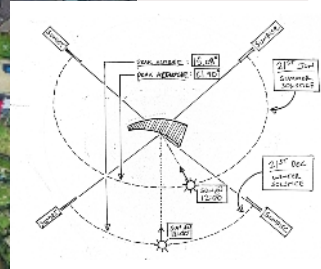
HOW?

2 Applying Project Based Learning

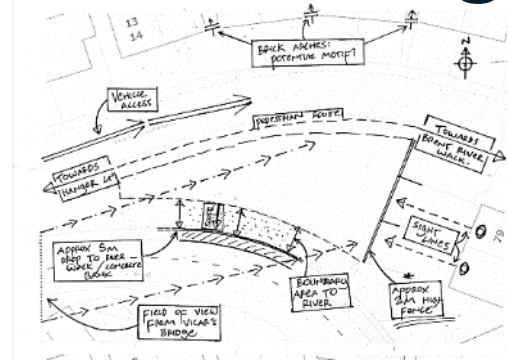
- PBL covers holistic design projects which investigate authentic complex scenarios.
- Reflective of Industry practice, students are required to interpret a client's design brief, establish preliminary outline designs, review, and critique these and finally produce a detailed design for one of their approved schemes.
- The briefs are formulated to realise the full structural, architectural, economic, aesthetic and sustainability benefits

HOW?

2 Applying Project Based Learning in BE modules



Site analysis **Real Location**



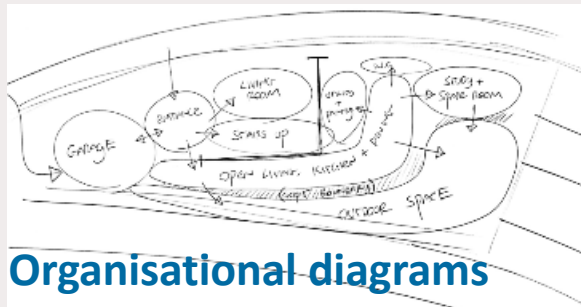
Brief is like a **real** project
'working for a client'

Room Schedule	
Room	Area
Living Room	26m ²
Dining Room	24m ²
Kitchen	24m ²
Studio/Guest Room	15m ²
Main Bedroom/Ensuite	15m ²
Double Bedroom n1	12m ²
Double Bedroom n2	12m ²
Single Bedroom	9m ²
Additional Toilet n1	4,5m ²
Additional Toilet n2	4m ²

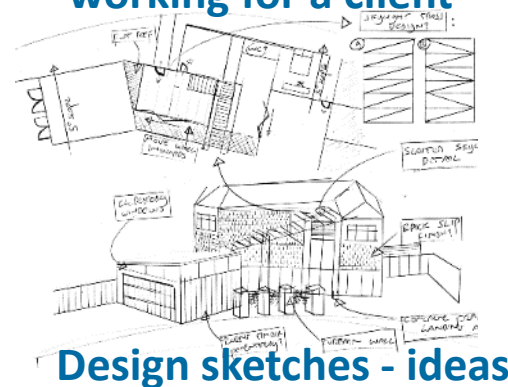
Schedule of
accommodation



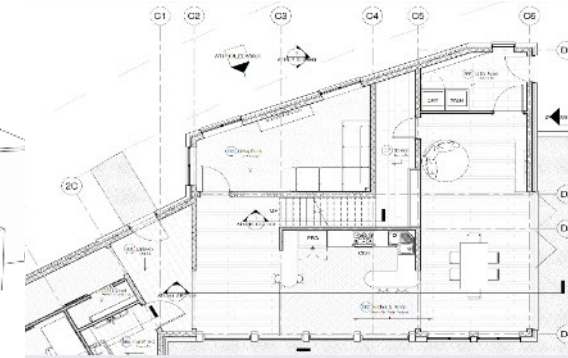
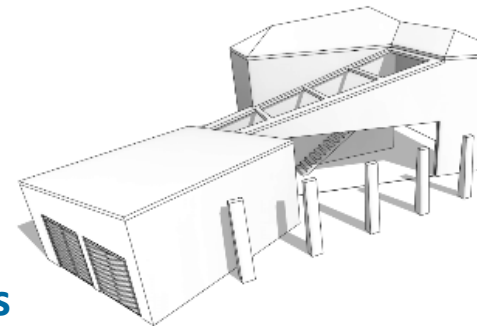
"Inspiration"



Organisational diagrams



Design sketches - ideas



Scaled drawings

HOW?



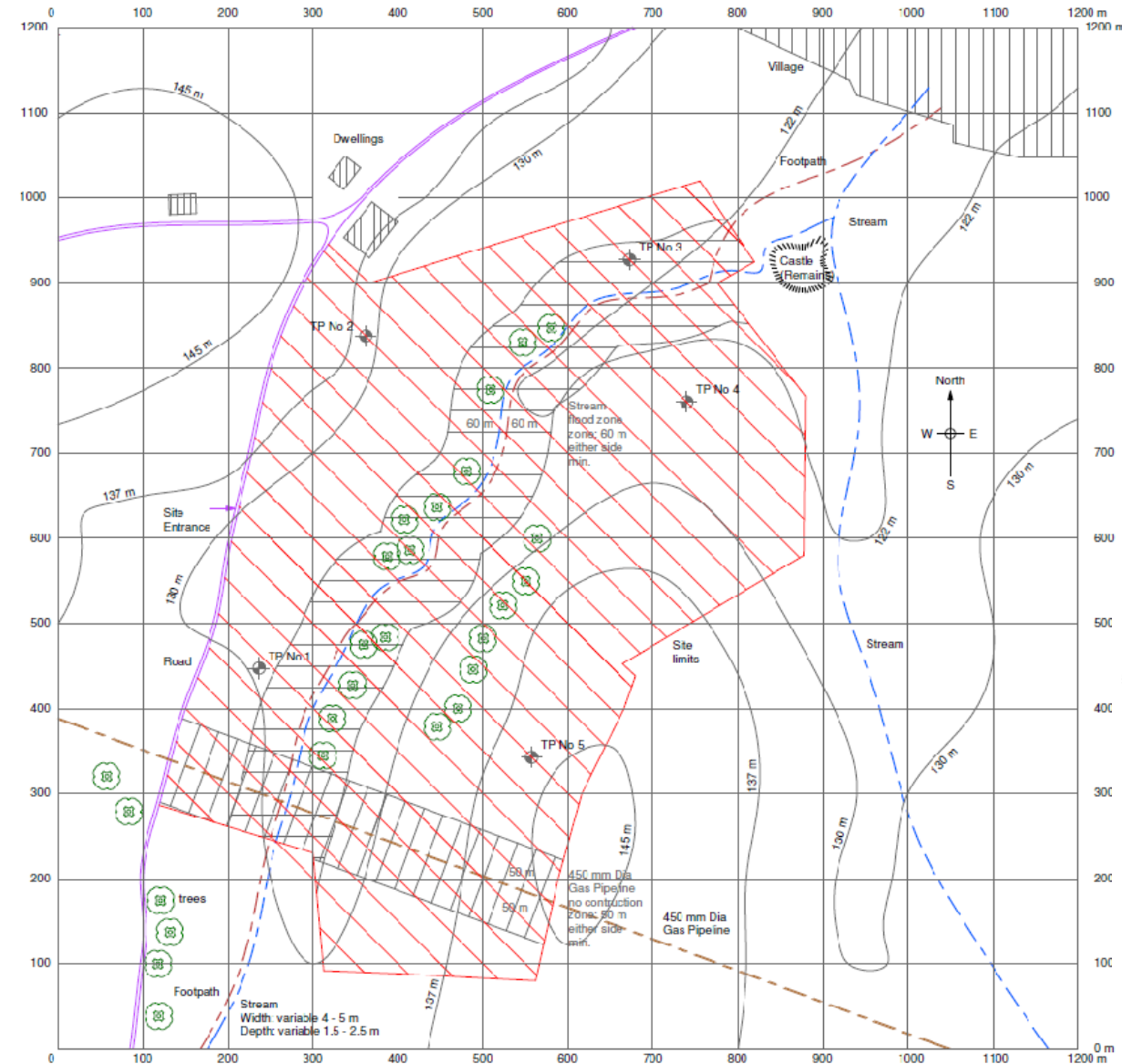
PBL practiced in Built environment modules simulating **real** projects

2 Applying Project Based Learning for structures

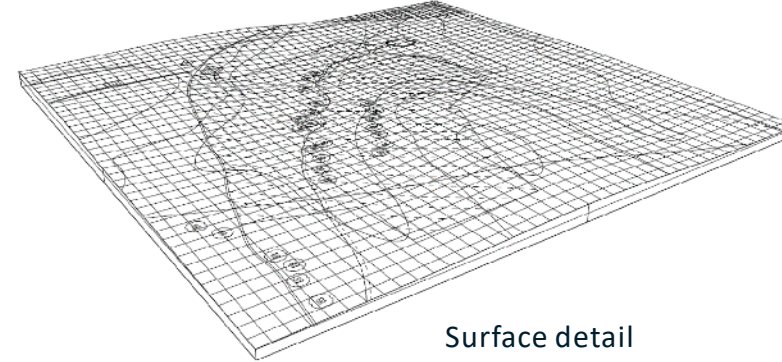
PBL practiced in Engineering modules simulating **real** projects

2

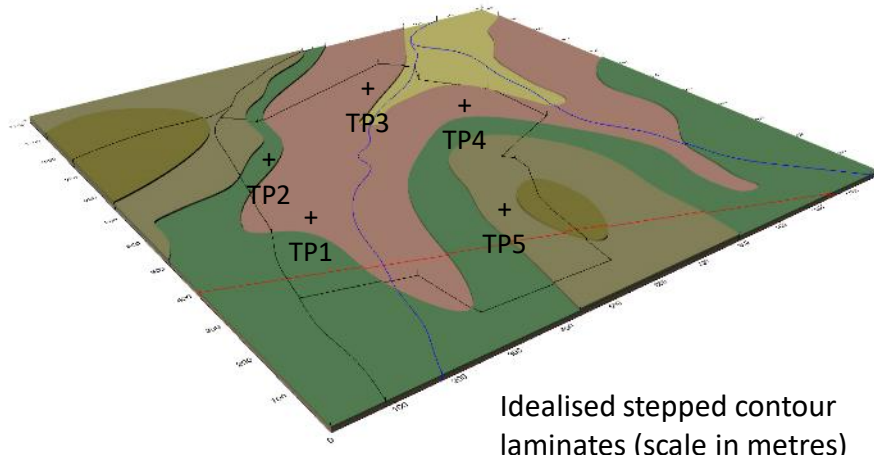
Leisure Pool and Facilities Project - Location



Site Plan



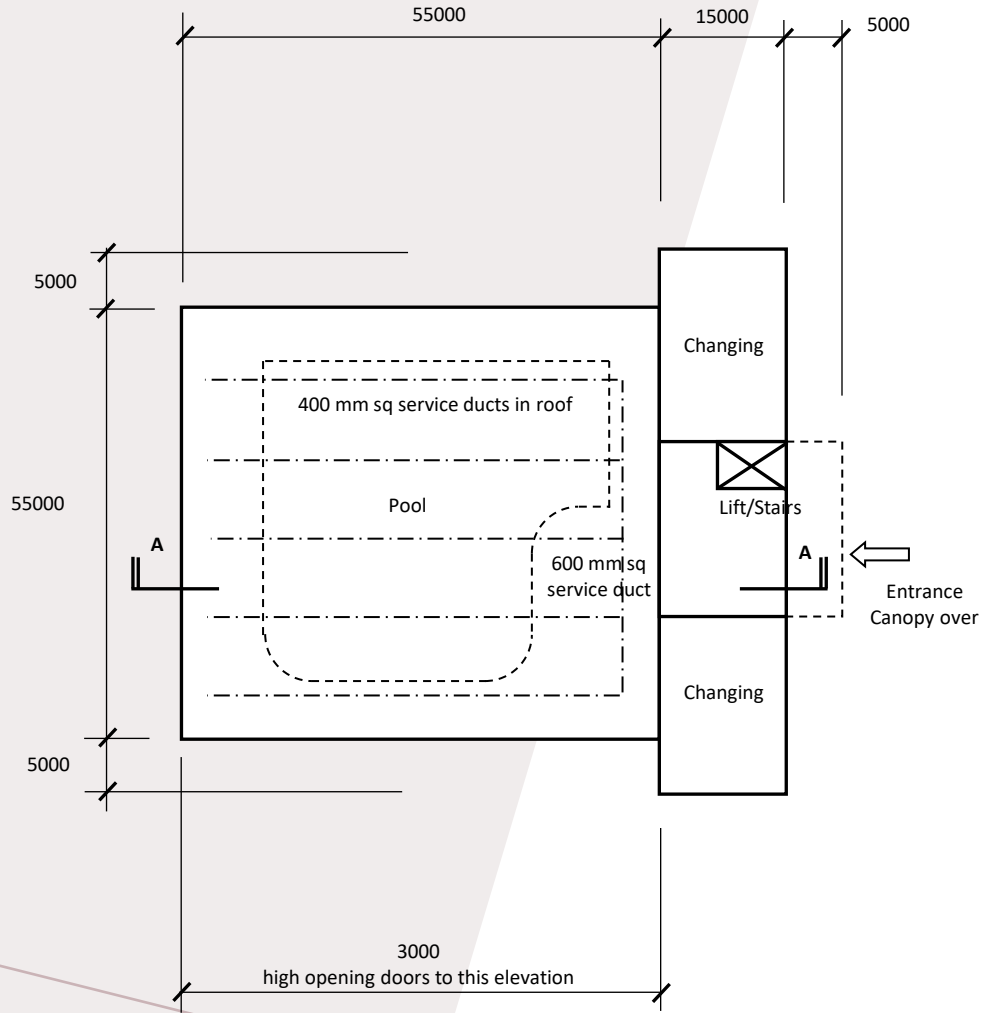
Surface detail



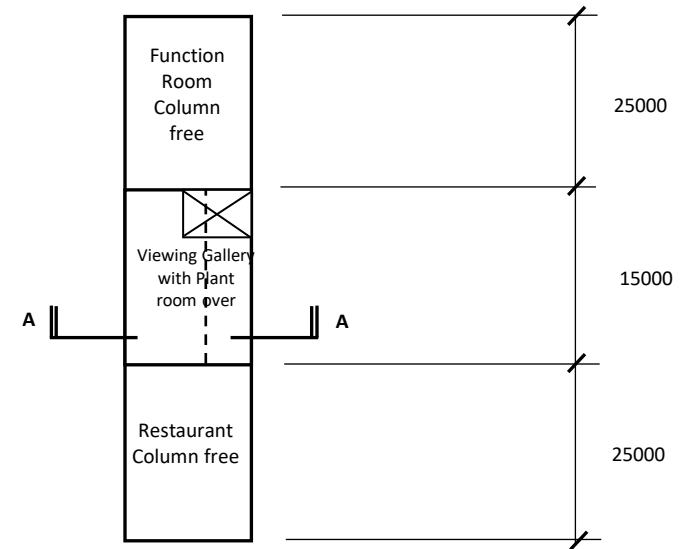
Idealised stepped contour laminates (scale in metres)

Ground Investigation Engineers		Job No	Sheet No			
		Job Title	Rev			
		Soil Profile Ground Level	129.0 m			
Client		1	Date			
Trial Pit		1	Date			
Made by		1	Date			
Checked by		1	Date			
Soil Profile		1	Date			
Depth (m)	Thickness (m)	Soil Description	Depth to Water (m)	Depth (m)	SPT N-value	Cv
0.1	0.2	TOPSOIL (Dark reddish brown friable silty clay with organic material)		0.2		
0.2						
0.3	0.3	Soft becoming firm fissured red silty CLAY with occasional rootlets		0.5		
0.4						
0.5						
0.6		Stiff fissured dark red slightly sandy silty CLAY				
0.7						
0.8						
0.9						
1.00						
0.1	2.85					
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.00						
0.1						
0.2						
0.3						
0.4						

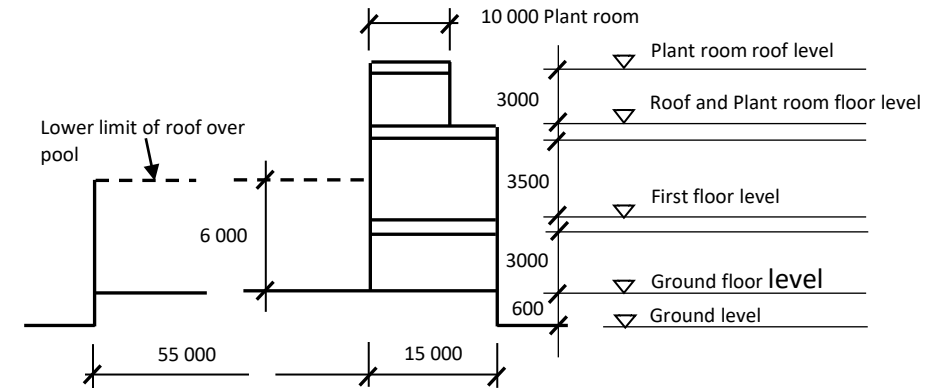
2 Project Brief - Leisure Pool and Facilities Project



Ground Floor Plan
All dimensions are in millimetres

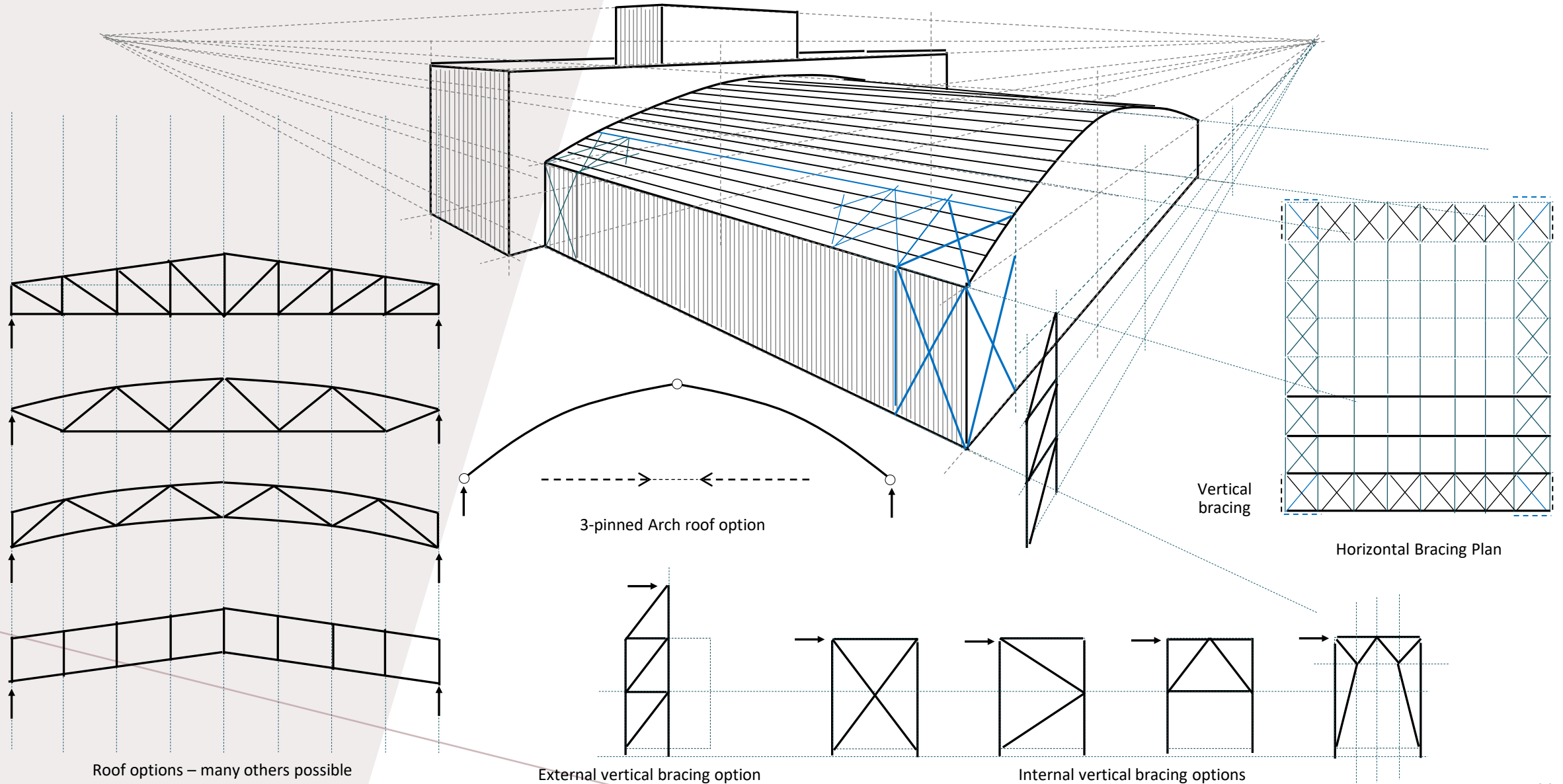


First Floor Plan
All dimensions are in millimetres



Section A - A
All dimensions are in millimetres

2 Leisure Pool and Facilities Project



2 Importance of Group work and PBL

- Students engage in group work which leads to subject-specific knowledge and helps develop inter-personal skills
- Further skills developed are **critical thinking, problem solving, teamwork** and **communication** as these are among the graduate skills most valued by employers
- Group interaction is based on gained experience from **PBL** activities encouraging creativity and good time management

HOW ?

2 Importance of Group work and PBL

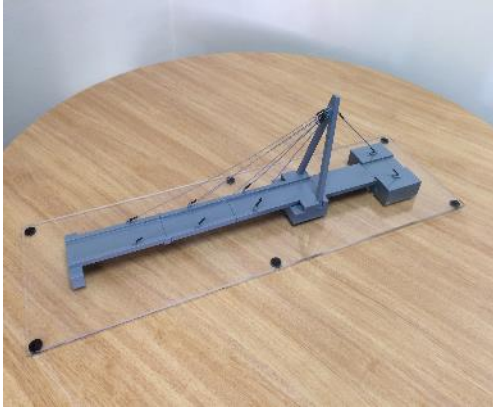


HOW ?

Working as a team with a common goal and a deadline

Group interaction is based on PBL activities encouraging creativity and good time management

2 Importance of Group work and PBL



3D Printed 'A' frame bridge over water to be constructed on site in 4.5 days



Pouring and striking concrete 'A frame' and decks



HOW ?



Foundation shuttering being installed after being set out



Reinforcement installation



Foundations cast and installing 'A' frame and decks



Residential field trips involving Group work

2 Importance of Group work and PBL



Group work



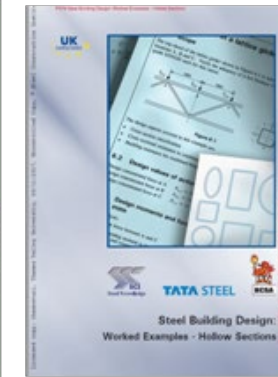
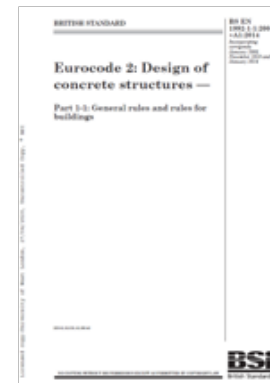
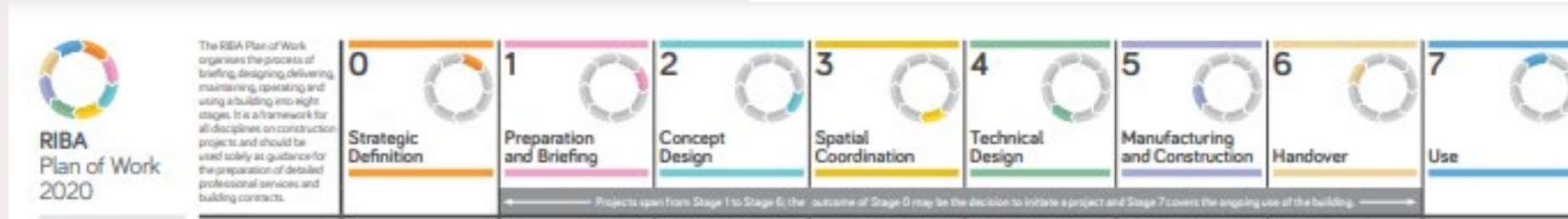
Load testing the finished bridge

Group interaction is based on gained experience from PBL activities encouraging creativity and good time management

Residential field trips involving Group work

HOW ?

3 Using industry standards communication methods

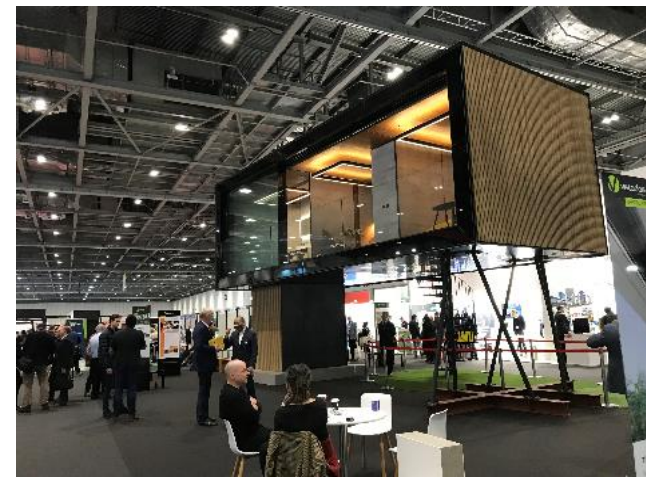


HOW?

- RIBA Plan of works
- Planning guidance and Building Regulations
- Metric handbook
- British Standards
- NBS



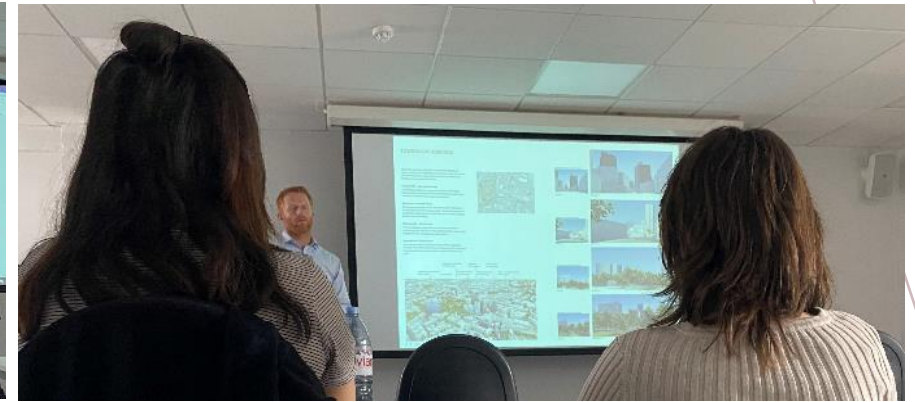
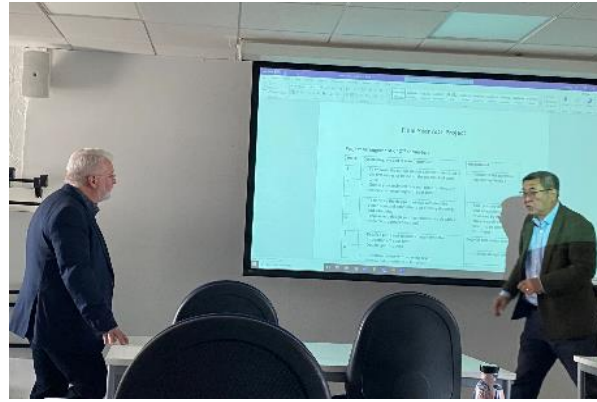
4 Visiting building sites, completed buildings and exhibitions



HOW?

Reinforcing curriculum elements by visiting **real** examples

5 Liaising with industry practitioners

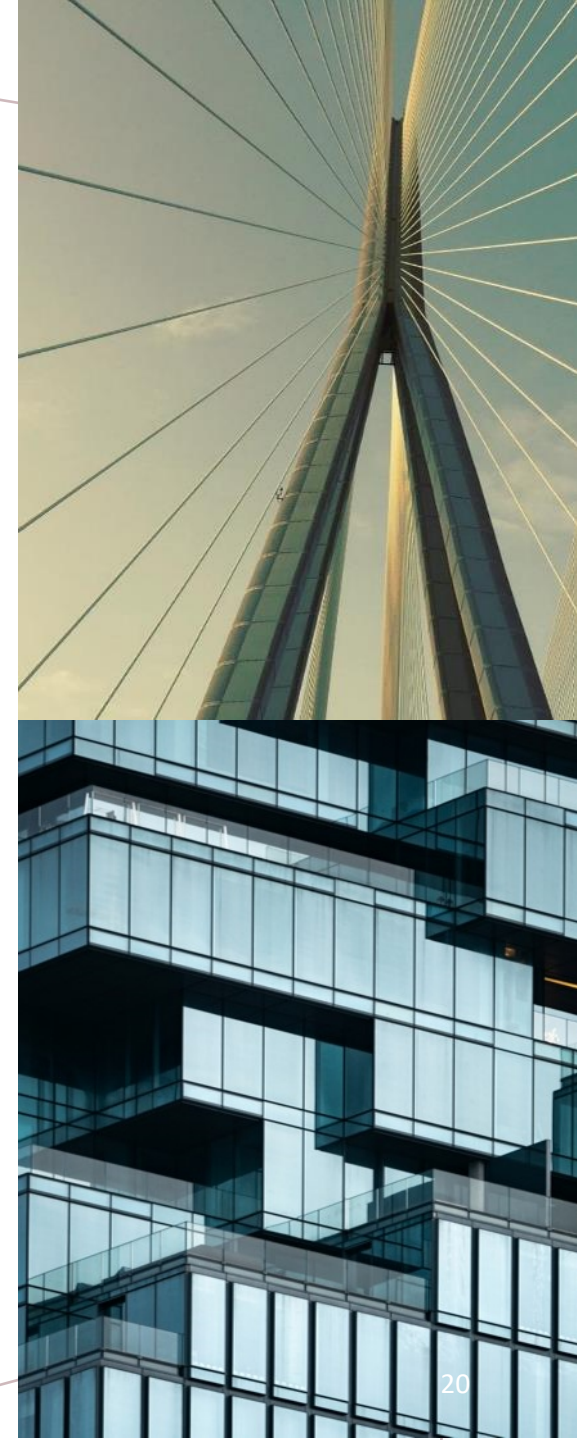


- Introducing construction practitioners to students through industry events
- Calling practitioners to the University as guest lecturers
- Work Shadowing / organising internships
 - *aiming to provide students with an insight into the world of **work***

HOW?

Conclusions

- Industry's changing expectations must be accounted for to develop graduate **skills** needed by **industry**.
- **PBL** in the form of realistic group projects supported by industry **motivates** students, **improves** learning, and **encourages** engagement with work related activities which **enhance** and **improve** graduate **employability**
- Project based learning skills support the UWL ethos as a 'career university'



References

- Adams, R.S., Daly, S.R, & Mann, L.M (2011) Being a professional: Three lenses into design thinking, acting and being. *Design Studies* 32(6) November 2011.
- Choi, H.H. & Kim, M.J. (2016) The effects of analogical and metaphorical reasoning on design thinking. *Thinking skills and Creativity* 23: 29-41.
- Higher Education Academy. (2013) *HEA Feedback toolkit*. Available at:
https://www.heacademy.ac.uk/system/files/resources/feedback_toolkit_whole1.pdf
- May, I.M (2009) What should we teach in structural engineering design. *ICE Proceedings, Civil Engineering*, 162:187-191.
- Royalty, A. (2017) Design based pedagogy; investigating an emerging approach to teaching design to non-designers. *Mechanism and Machine theory* 125.
- Rizzuto, J. P. (2018) ExPERT Festival of Learning and Teaching Conference, Developing Creative Professionals. Developing creativity through conceptual structural design. University of West London, UK, June, Abstract, pp 22.
- Rizzuto, J. P. and Chauhan (2018) Student site: scope, scale and challenges. *RICS Construction Journal*, Feb/March issue, pp 16-18.
- Rizzuto, J. P. and Balodimou, E. (2019) ExPERT Academy Festival of Learning and Teaching Conference, What is the point of feedback? Understanding feedback and feed-forward: insights drawn from project-based learning. University of West London, UK, July, Abstract, pp 7.